

4 1/2" NEWTONIAN REFLECTOR

Even in this day of large "light bucket" reflectors, there is still much to see and study with smaller apertures. The classic 4 1/2" Newtonian is ideal for this and is quite probably the perfect introductory astronomical telescope for the serious student regardless of the users age. The 4 1/2" is the first of the "big" aperture telescopes because it gets over the hump of light gathering power allowing one to see fainter objects, resolve stars and show more detail where scopes of smaller diameter would fail. The 4 1/2" gathers 265 times as much light as the unaided eye, will resolve to 1.1 arc/sec. and has a limiting magnitude of +12.5. This allows a 4 1/2" reflector to show the following:

THE MOON:

An enormous amount of detail is visible. Features approaching two miles in size are clearly seen. Mountain ranges, the walled plains, valleys and tiny craters present a never to be forgotten sight. One can spend the greater part of an observing lifetime exploring our near neighbor with a 4 1/2" reflector.

VENUS and MERCURY:

The phases of these two planets are extremely interesting to follow. Both of these planets can be seen with a 4 1/2" in the daytime, and irregularities in the terminator of Venus are occasionally reported.

MARS:

At opposition and using coloured filters, the white polar caps, dark maria and orange-red deserts are clearly discernible.

JUPITER:

Up to six cloud belts can be seen with festooning and other fine detail visible on good nights. The Great Red Spot is often seen under favorable conditions. The four Galilean moons are an ever changing sight with such phenomenon as occultations and transits occurring periodically.

SATURN:

The ring system is easily seen including Cassini's division. Detail on Saturn's globe is quite noticeable. Titan, Saturn's largest moon is very apparent as well as the moons Rhea, Tethys and Dione being just visible close in to Saturn.

DOUBLE STARS:

Dawes limit of 1.1 arc/sec. is attainable on nights of exceptional seeing. Epsilon Lyrae is easily separated into its four components. Castor, Alberio and a host of other fine doubles are all within reach with some observers having separated 52 Orionis (1.4 arc/sec) as two distinct points on nights of good seeing.

DEEP SKY:

ALL OF THE MESSIER OBJECTS are observable with the 4 1/2" reflector! Larger globular clusters can be resolved at the edges into many hundreds of points of light. The Orion nebula will fill the field at low power while the satellites of the great Andromeda galaxy can be plainly seen. The total number of stars within range of the 4 1/2" reflector is nearly 2,250,000! These optical capabilities coupled with light weight and portability make the 4 1/2" Newtonian a telescope that can serve the needs of beginning and even veteran observers for many years.

THE 60mm. REFRACTOR TELESCOPE

The smallest telescope which proves astronomically useful is the 60mm. refractor. It has an objective lens 60mm. in diameter. All smaller refractor telescopes should be considered in the toy class; they will not gather enough light to show objects bright or with much detail and their quality of construction is questionable. The 60mm. refractor is preferable by far to the 3 inch reflector in quality and overall performance! The 60mm. gathers 73 times more light than the unaided eye, has a limiting magnitude of +10.9 (100 times fainter than the unaided eye) and resolves to 1.9 seconds of arc; the width of a quarter as viewed from a distance of two miles! Although many 60's have magnification claims of 450x or MORE, magnification is not the determining factor in evaluating telescope performance. Any telescope can be made to magnify to just about any limit but there is a USEFUL maximum. The limit for ANY telescope is a maximum of 60x per inch of the objective diameter under ideal observing conditions. Anything over this limit is called "empty magnification". Image quality, brightness and detail degrade rapidly as there is not enough light being gathered to be effectively magnified. This means that a 60mm. (2.4") has a maximum of 144 power (x) available on nights of especially good seeing. However, this is plenty of magnification for a dedicated observer to see the following:

THE MOON:

Craters and details below 5 miles in diameter are clearly seen along with mountain ranges, valleys, ray structures and mountain peaks. So much can be seen that one can spend the majority of an observing lifetime studying the Earth's only natural satellite! A good lunar atlas or map is highly recommended to insure the success of lunar studies.

MERCURY and VENUS:

The phases of both these planets can be followed through their entire cycle. With experience, the observer can readily find both Mercury and Venus in the daytime when observing is at its best.

MARS:

Without doubt, Mars is the most difficult object in the heavens to observe because of its small diameter and low contrast even at favorable opposition but at such times and using a red filter, the polar cap and the "desert" Syrtis Major are very apparent.

JUPITER:

Up to four cloud bands can be seen on the globe as well as the moons Io, Europa, Ganymede and Callisto as they change their positions constantly from night to night.

SATURN:

The ring system is clearly visible at medium powers and when face on, Cassini's division within the rings can be seen. The moon Titan is discernible just beyond the rings at magnitude +8.

BEYOND THE SOLAR SYSTEM:

Over 850,000 stars are within the range of a 60mm. telescope many of which are multiple star systems. The vast majority of the Messier objects of nebulae, clusters and galaxies can be located from a dark sky site while many fuzzy areas of the sky resolve into stars without number. With a dose of curiosity, the humble 60mm. can indeed be the tool for a lifetime of exploration.